

Figure 1

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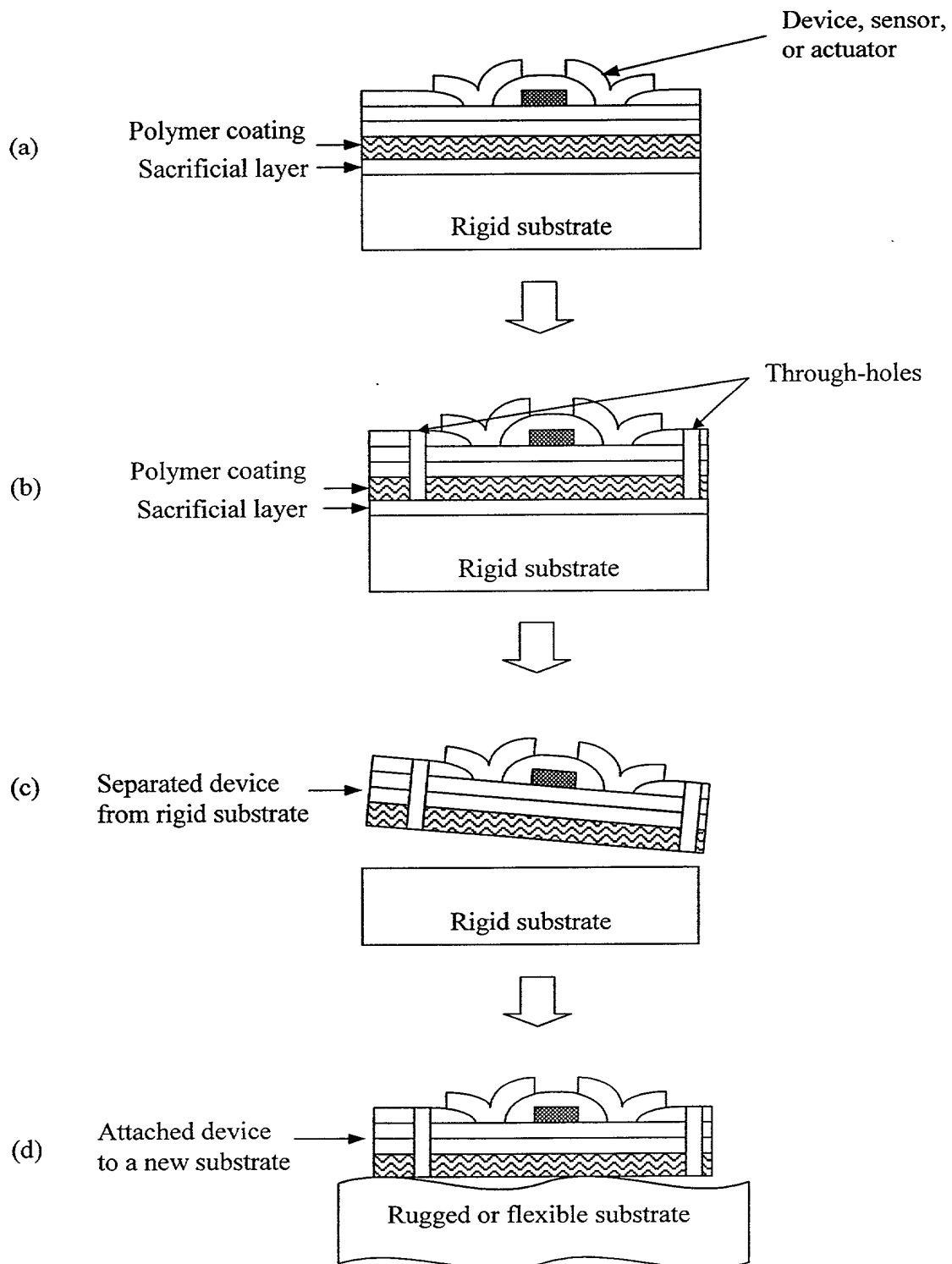


Figure 2

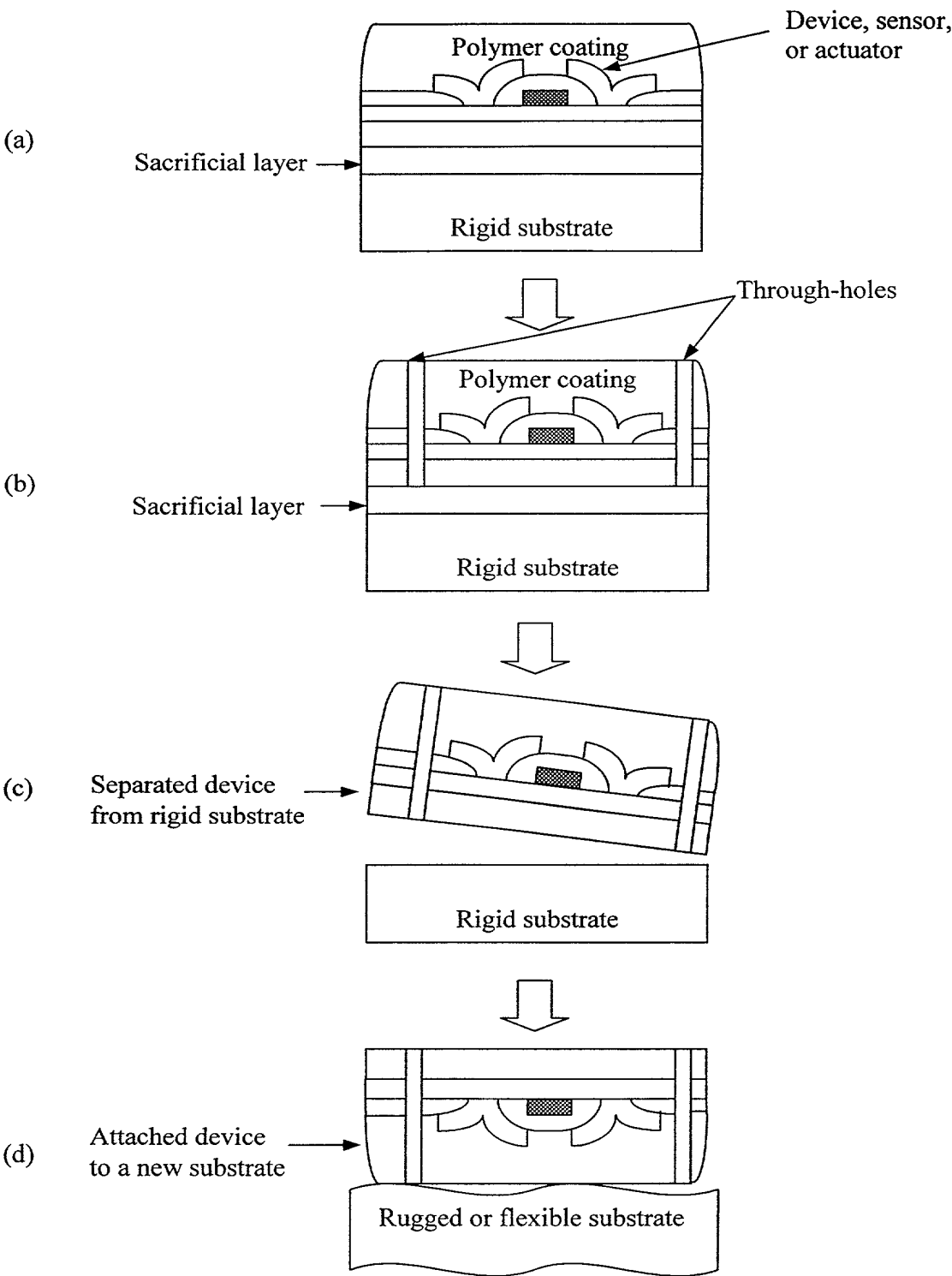


Figure 3

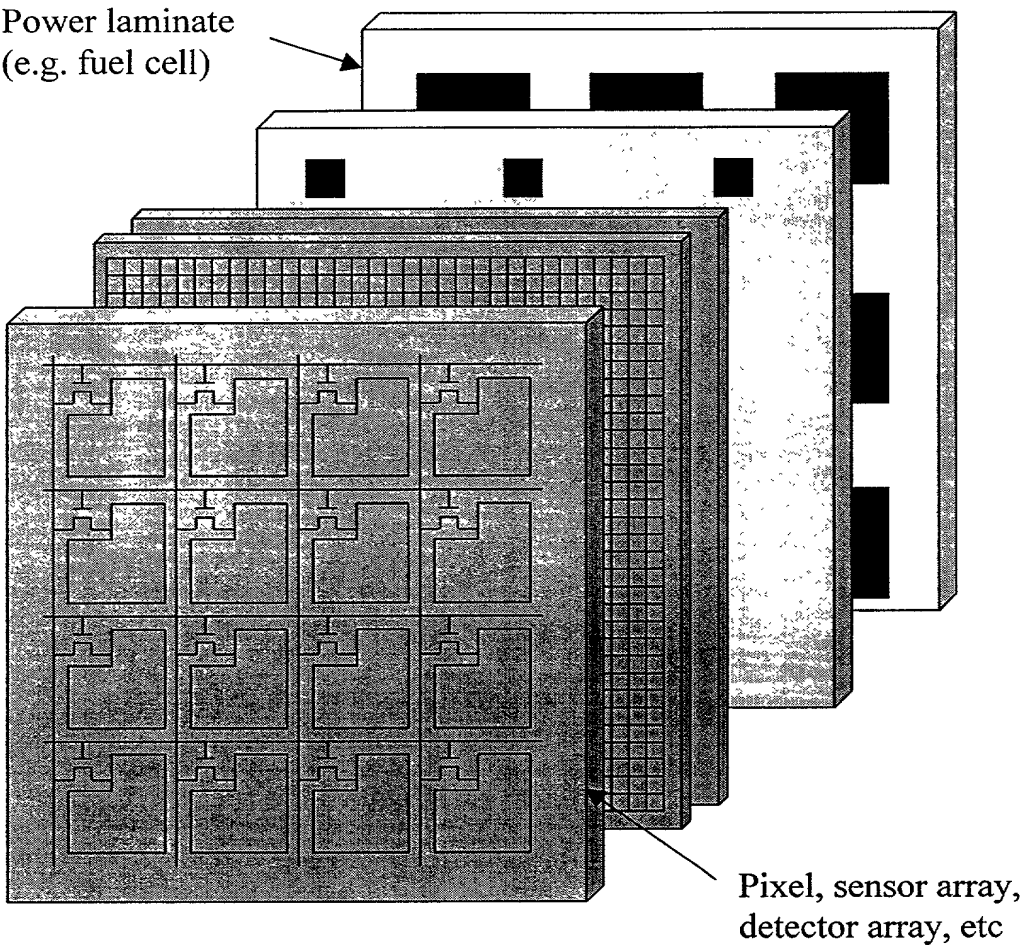
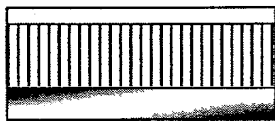
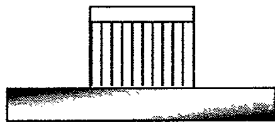


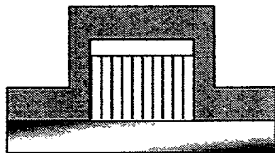
Figure 4



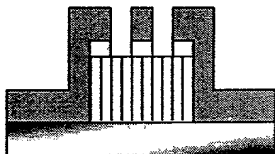
(a) Sacrificial layer deposition



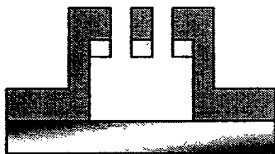
(b) Lithography and etching



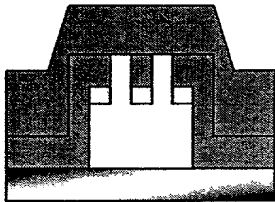
(c) Wall /capping layer deposition



(d) Wet etchant access window etching
(Holes occur as needed in top or sides for effective etching)



(e) Sacrificial layer etching



(f) Window filling



Substrate



Air (empty space)



Column/void silicon

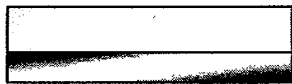


Cap layer



Wall material

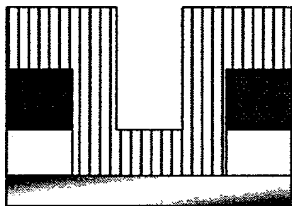
Figure 5



(a) Base layer deposition



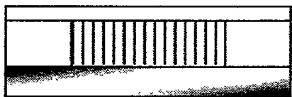
(b) Lithography and base layer etching



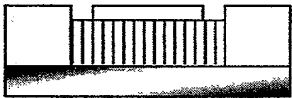
(c) Sacrificial layer deposition



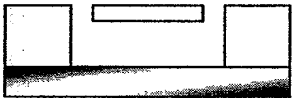
(d) Lift-off



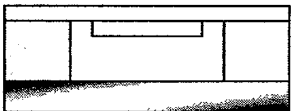
(e) Capping layer deposition



(f) Wet etchant access window etching
(Holes occur as needed in top or sides for effective etching)



(g) Sacrificial layer etching



(h) Window filling

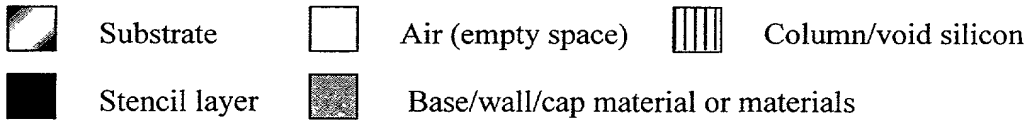
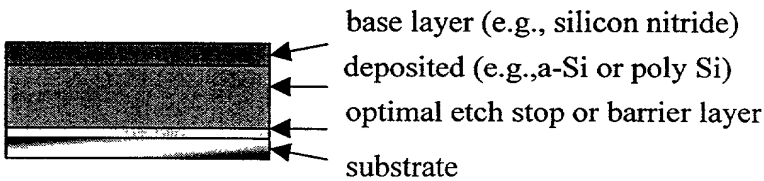
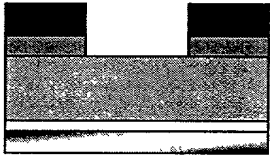


Figure 6

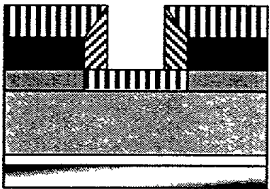
(a) Base layer deposition



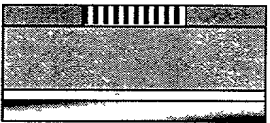
(b) Lithography and base layer etching



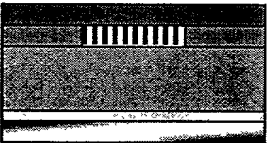
(c) Sacrificial layer deposition



(d) Lift-off



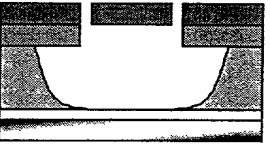
(e) Capping layer deposition



(f) Etchant access window etching



(g) Sacrificial layer etching and trench creation



(h) Window filling

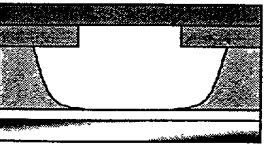


Figure 7

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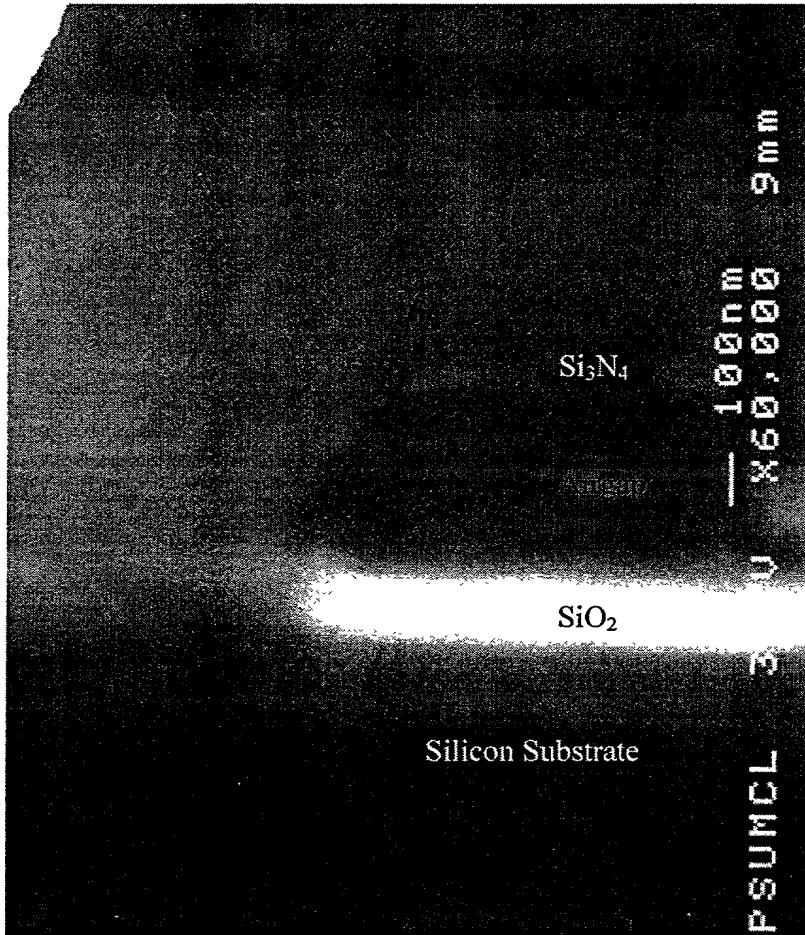


Figure 8

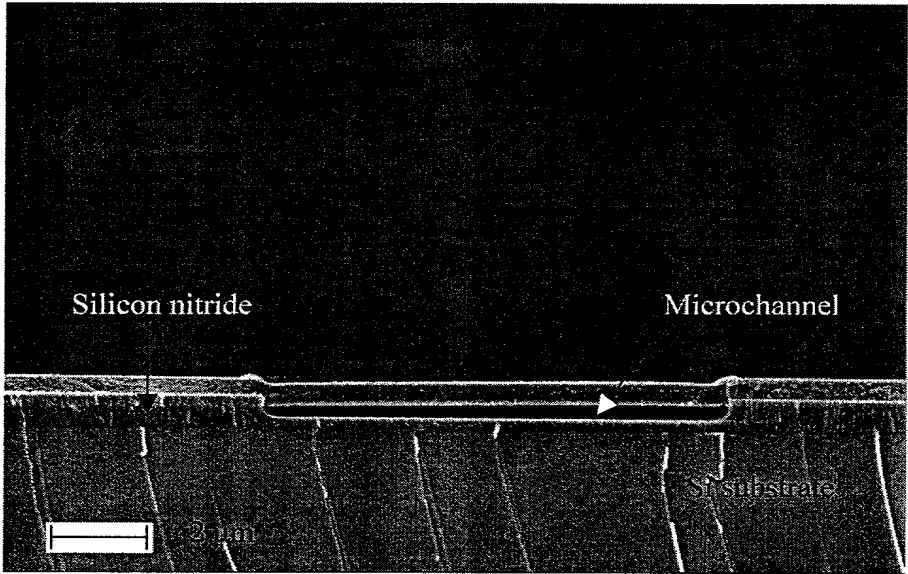
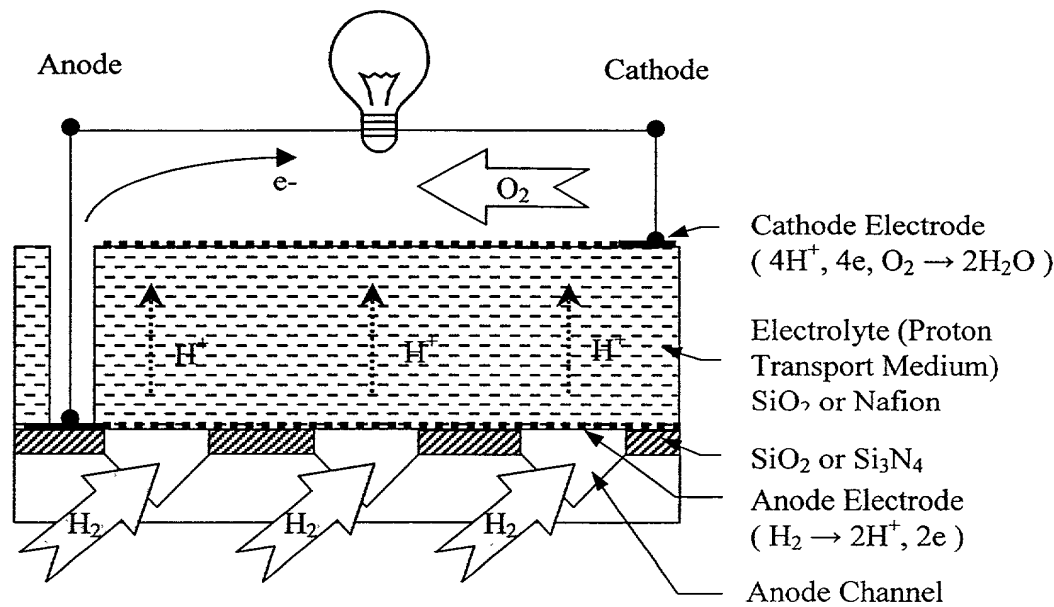


Figure 9

(a)



(b)

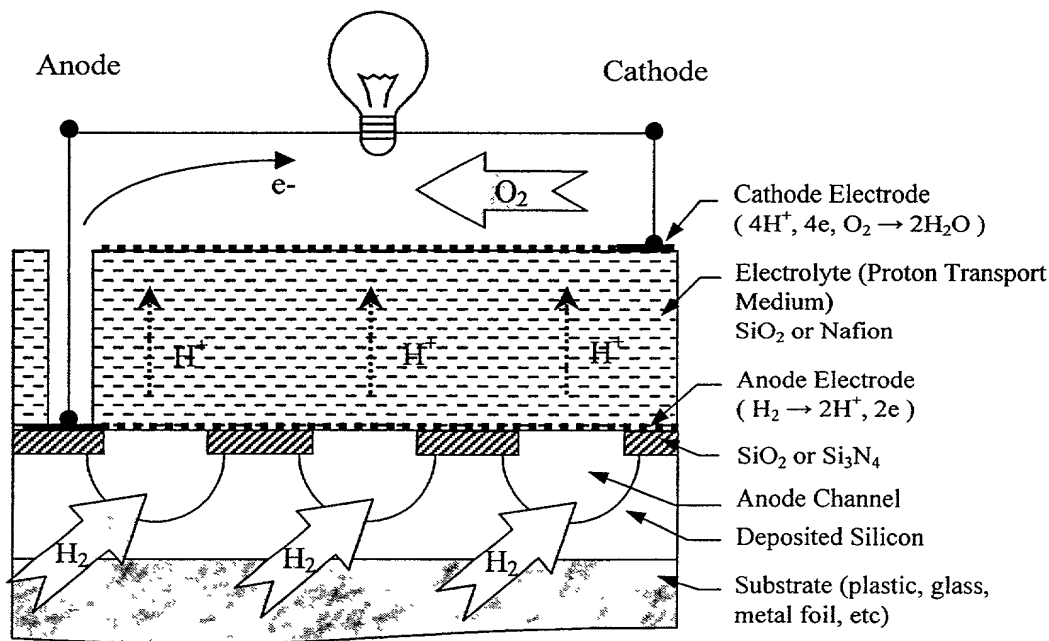
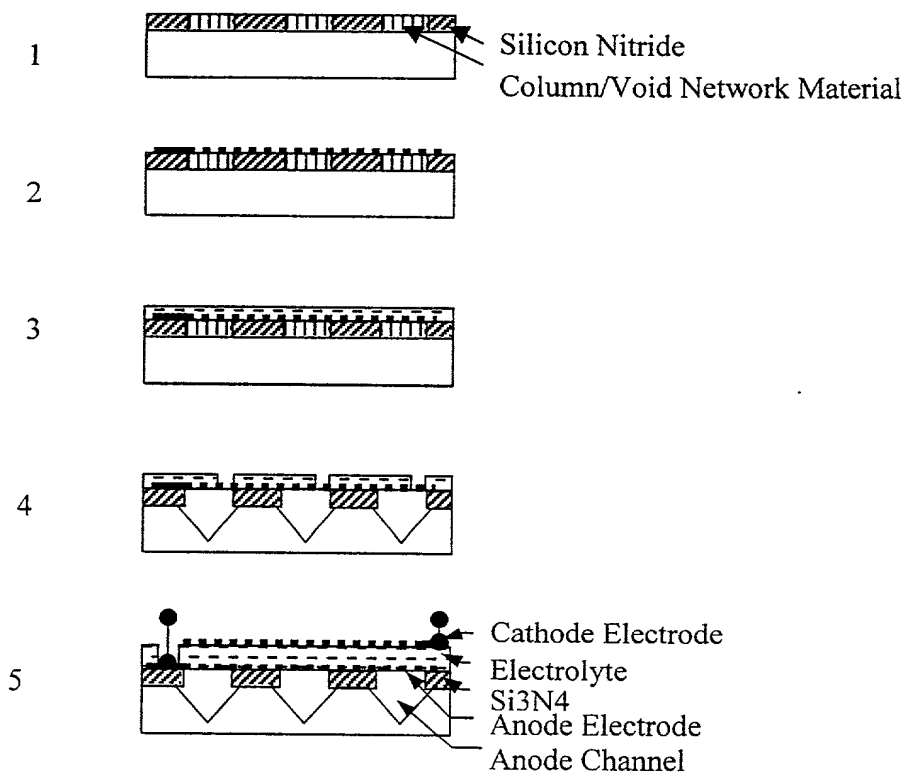


Figure 10

(a)



(b)

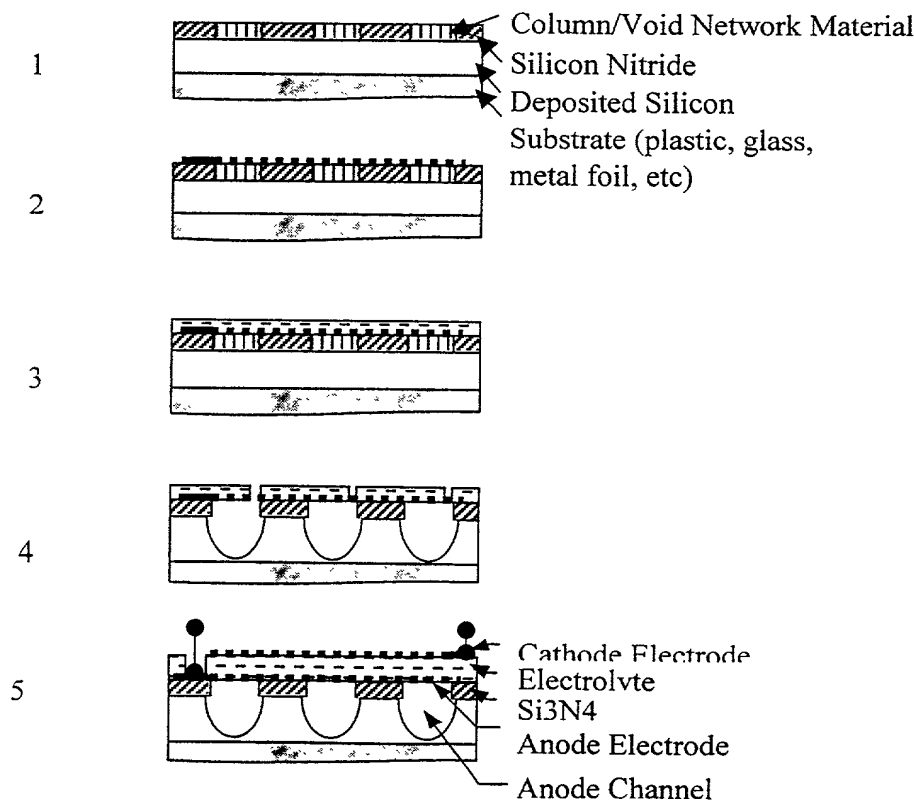


Figure 11

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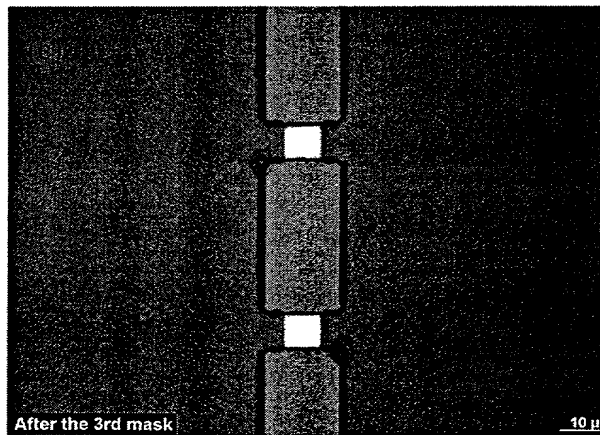
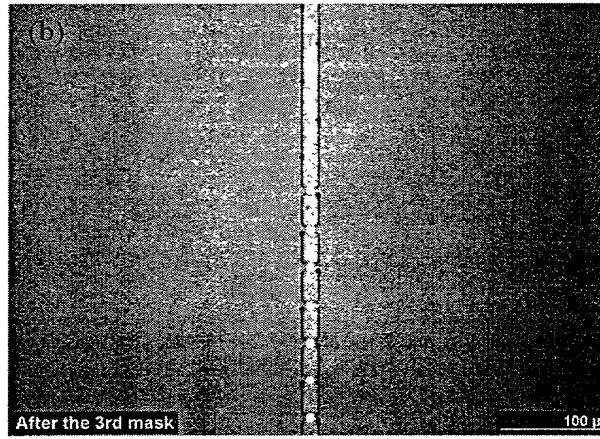
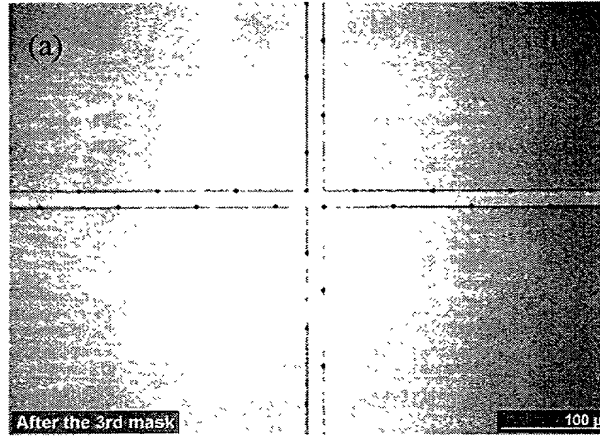


Figure 12

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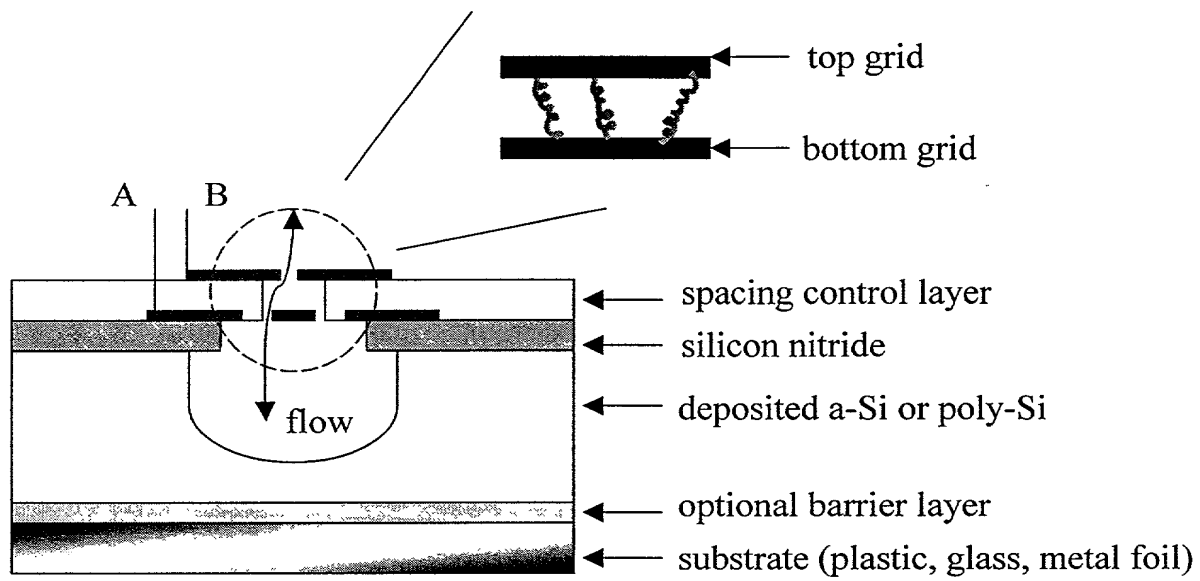


Figure 13

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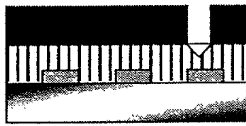
(a) Cr/Au deposition



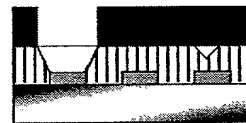
(b) Lithography and etching



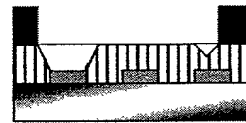
(c) Column/void network
material deposition



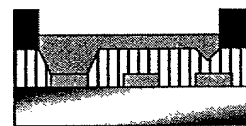
(d) Contact tip etching



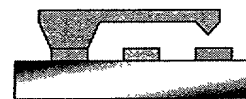
(e) Beam support etching



(f) Lithography



(g) Au deposition



(h) Column/void network material
etching

Figure 13: Cross-sectional diagrams illustrating the fabrication process of a microstructure. The process involves multiple steps: (a) Cr/Au deposition, (b) Lithography and etching, (c) Column/void network material deposition, (d) Contact tip etching, (e) Beam support etching, (f) Lithography, (g) Au deposition, and (h) Column/void network material etching.